RNP Solutions in Australia

Australia’s PBN Transition brings Opportunities for Active Noise Abatement.

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Drivers
Opportunities for Active Noise Abatement in the RNP Family

ICAO PBN Specification

RNP
- **En Route**
  - RNP 4 / RNP 10 Oceanic
  - RNP 2 Continental
- **Terminal**
  - RNP 1
  - RNP 0.3
  - RNP APCH
  - RNP AR APCH

RNAV
- **En Route**
  - RNAV 10 Oceanic
  - RNAV 5 Continental
- **Terminal**
  - RNAV 2
  - RNAV 1
RNP AR APCH

- Australian History:
  - Qantas sponsored trial which led to a broader implementation project.
  - Now an ongoing program driven by customer-identified need.

- Examples of placing the flight path so the residual noise has less impact:
  - Brisbane ‘River Track’ and
  - Canberra Runway 35
Brisbane ‘River’ track

- Demonstration site
  - First flights January 2007
  - 11k participating flights through October 2008
- Replicated an existing visual procedure.
- Three potential areas of noise benefit were suggested as:
  - Higher vertical profile with constant descent.
  - Later landing configuration.
  - Residual noise focussed over river and industrial area.
Brisbane ‘River’ track: Population Overflown

- Allowing for the navigational accuracy of each procedure the affected population captured by each was
  - Visual procedure (±0.7NM) : 63300
  - RNP AR procedure (±0.3NM) : 24550
Brisbane ‘River’ track: Noise Contour

Conventional ILS

RNP AR
Canberra RWY35

- 85% of arrivals use RWY35.
- Merge point moved over farmland west of new residential developments in Jerrabombra.
- LAmax reduction of 6 to 10dB(A) forecast.
- Additional benefit from RWY17 missed approach using a similar lateral path.
Vertically Guided RNP Approach

• BaroVNav in the Australian context
• Superior energy management through FMS
• Driver isn’t typically necessarily ANA but there is something there

Into the future:
• Extend vertical guidance into STAR phase if there is a need
• Add RF leg to procedures where there is a need.
RNP into xLS

- Flown as a one off as RNP into GLS at Sydney in 2009.
- More recent trials and implementations of both ILS and GLS around the world.
- Procedures well developed and understood.
- Wider trial and deployment planned in Australia for both ILS and GLS final segments.
Leveraging GLS Capabilities

Combine the capabilities:

- RNP into GLS
- Adaptive Glideslope
- Displaced Threshold

- RNP to GLS
- 1.4NM Short Final
- 3° glideslope

- RNP to GLS
- 1.4NM Short Final
- 3.5° glideslope
- 1000 ft displaced threshold
Constraints
Runway Alignment
Sunshine Coast, RWY36

- No precision approach or RNAV (GNSS) available, only conventional non precision approach.
Sunshine Coast, RWY36 RNP AR

- Proprietary procedure limited to A320.
- FROP is 1.22NM from the threshold @ 449ft
- Can’t be duplicated with ICAO criteria
Turn Radius: RF Legs

• The RF leg is key to much of the available benefit.
  • Precisely locating turn entry and exit and containing the curved path.

• BUT is limited by:
  • Angle of bank and speed.
  • Tangential entry and exit.
## Approach Minima

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Lessons

• Consider the whole path and its interaction with surrounding Air Traffic Management procedures not just the approach in isolation.
  • A perfect procedure that can’t be issued by ATC is wasted.

• In the Australian environment, RF Legs and vertical guidance offer best return for effort and resources.

• Consultation:
  • Early and often.
  • Community don’t particularly care about the technology they care about the outcome.
  • Focus on a win/win outcome not winning the fight.
Thank You

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